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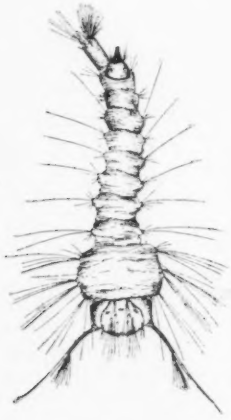

Larva of Culex perturbans as described by Dr. John B. Smith.

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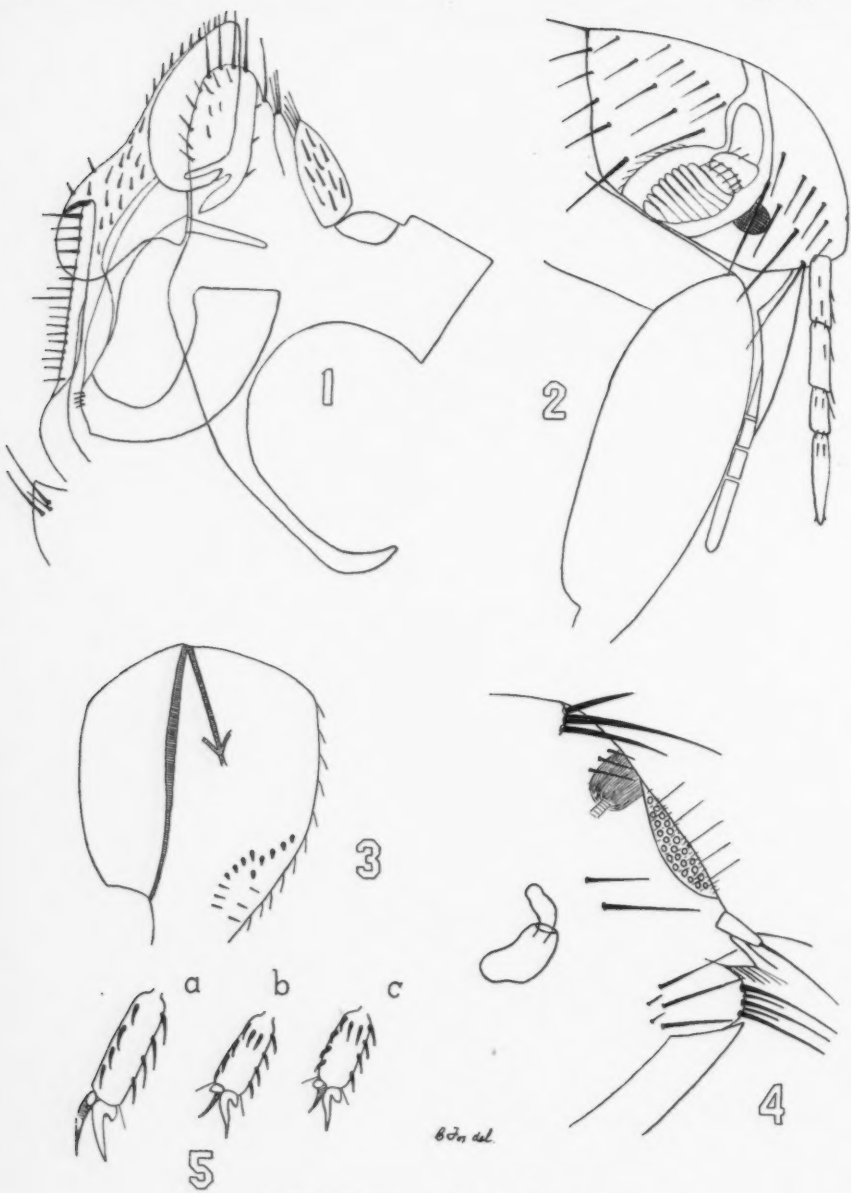

ODONTOPSYLLUS WYMANI FOX.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XX. JUNE, 1909. No. 6.

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A New Species of Odontopsyllus—a Genus of the Siphonaptera.

BY PASSED ASSISTANT SURGEON CARROLL FOX, P. H. & M. H. S., San Francisco, California.

(Plate X.)

Three male and ten female specimens from the California field mouse (*Microtus californicus*) collected in the Summer of 1908. Mr. Rothschild pronounced this a new species, closely related to *O. telegoni* and *O. charlottensis.*

Odontopsyllus wymani spec. nov.

Head evenly rounded from the posterior margin of the occiput to the anterior lower angle of the frons in the female; flattened on top in the male. Frontal notch indistinct. Eye present. Antennal groove reaches to top of head in both sexes. Gena acute at apex. Maxilla triangular. Maxillary palpi almost as long as the labial palpi. Length of joints as follows: 4-4-3-6. Labial palpi five jointed, extends two-thirds the length of the anterior coxa. Antenna three jointed, the last joint being divided into nine pseudo-joints, in which the separations are more distinct on the upper surface. Second joint contains about six hairs, while the first joint contains four or five small ones. The frons contains two rows of bristles, the lower row of four larger ones, the innermost one placed above the eye on the margin of the antennal groove, the third is the smallest and placed above the eye. The upper row consists of six smaller bristles. There is a row of small hairs

along the posterior edge of the antennal groove. The occiput contains three rows of bristles, an anterior row of about five or six small ones, a middle row of about six, somewhat larger and a subapical row of about six. The lowest of these bristles are the longest. The pronotum has one row of about ten bristles with a ctenidium of about fourteen spines. The mesonotum has two rows of bristles, a posterior of about eight larger and an anterior of about sixteen smaller ones. In front of this row there are a few hairs, more or less regularly disposed. The same may be said of the metanotum. The episternum of the metathorax contains two bristles, the sternum one or two larger ones. There are two rows of bristles on the epimerum, an anterior and posterior which contain four bristles each. The lowest in the posterior row is very much the largest. Still posterior to this is a single large bristle. The first tergite contains two rows of bristles, an anterior of ten large and a posterior of more numerous smaller bristles, The next six tergites each contain two rows of bristles, the posterior of about fourteen large, of which the lowest is placed just below the stigma and an anterior of about fourteen smaller ones. On the first tergite there is one tooth, and on the second, two teeth, on the third and fourth, one tooth on each side. The third, fourth, fifth and sixth sternites each contain a single row of about six bristles with two smaller ones just anterior to this row. The seventh sternite in the female contains about eight or ten larger bristles with a few small ones in a row anterior. There are three antipygidial bristles on each side, the middle of which is the longest. The fore coxa is normally bristled, while the fore femur contains two rows of bristles on the outer side of about five bristles each. The mid and hind femur are without bristles on the lateral surface. The hind coxa contains a patch of eight or ten teeth and a few hairs on its inner surface. The fifth tarsal joint of the fore and mid leg contains four lateral spines and a fifth pair between the first pair. The last tarsal joint of the hind leg contains four pairs of lateral spines. The spines on the posterior border of the hind tibia are in pairs while the lateral surface is covered with about eighteen bristles in two rows placed close together. None of the apical bristles of the tarsi are longer than the next preceding joint. Length of tarsal segments:

Hind tarsus	12	9	6	3½	6
Mid tarsus	6	6	4	3	5
Hind tarsus	13	10	7	4	7
Mid tarsus	6	5	3	2½	5

Modified Segments: The eighth sternite contains a row of about eight small hairs, while laterally there are two bristles, a large and a small, beneath and in front of the pygidium. Below there is a row of three stout bristles with a few smaller ones while on the apical margin there are also about three large bristles and a few small ones. The

style is long and slender, somewhat longer at the base than at the apex where there is a long hair. There is also one arising from its upper and lower borders.

Modified Segments: The eighth sternite is prolonged upwards into a slender process on the ventral edge of which are a number of hairs, giving the appearance of a comb. At the tip there is a hook-like spine. The claspers are broad, the manubrium extending forward as a slender well curved process. The process of the claspers is wide and well rounded at the top, with a row of bristles along its upper and ventral margin, the four upper ones being the largest. Besides this, on its lateral surface, are about six smaller bristles. The finger is leaf-shaped, convex on its posterior margin, its anterior margin being straight, narrower at the tip than at the base with a small pedicle.

Length of female ..... 2.14 mm.
Length of male ..... 2.08 "
Color .....pale brown

EXPLANATION OF PLATE.

Fig. 1.—Claspers of male.
Fig. 2.—Head of female.
Fig. 3.—Inner surface hind coxa.
Fig. 4.—Genitalia of female.
Fig. 5.—(a) Last tarsal article hind leg.
(b) Last tarsal article mid leg.
(c) Last tarsal article fore leg.

A New Thomisid.

BY K. R. COOLIDGE.

Misumessus munieri sp. n.

Cephalothorax a trifle longer than broad, anteriorly more than half as broad as in the middle, between second and third pair of legs, just as long as tibia or metatarsus I. longer than metatarsus II.; above not very highly arched, in the middle almost the highest, from there to the front only a little inclined, in the back declining obliquely.

Color, grassy-green, eye-space of caput much lighter and palish; median fosse, corselet grooves and cephalic suture darker. A series of three black points in the line of the P. S. E., and also two others, more minute, on median line of caput.

Rear row of eyes but little procurved, almost aligned; fore row strongly recurved. P. M. E. about equal in size to A. M. E., but smaller than P. S. E. or A. S. E., which are also about equal; M. E. of both rows farther apart than S. E.; ocular tubercles strong.

Abdomen subcordate, broadest in the middle, rather pointed before, somewhat depressed; longer than broad.

Ground color rather dirty creamish brown; a narrow, uneven dorsal brownish line border, producing a striking heart-shaped appearance; a number of small median brownish points interior to this. Venter paler, sternum light bluish green, flat subcordate.

Legs and mandibles green, tibia and metatarsus somewhat lighter. All legs moderately slender, armed with numerous long but weak spines; tibia I. with eight spines, metatarsus I. with ten, arranged in series of two each; tibia II. with six spines below, also in pairs. Length, 10 mm.

Habitat.—Muir Woods, Marin County, California.

Described from a single specimen, a female, collected by Mr. L. E. Munier of San Francisco, to whom I take pleasure in dedicating this dainty species.

It may prove to be *M. pictilis* Banks, but I am satisfied from a comparison with specimens of that species from the type locality (Palo Alto, Santa Clara County), that it is sufficiently distinct. By the structure of the epigynum it also comes close to *Misumena importuna* Keyserling, described from San Mateo County.

Thanatus coloradensis Keyserling.

This species is evidently well distributed throughout California, particularly in the southern parts. It was originally described from Colorado. It might be called the "hedge spider" in the San Joaquin Valley, as it is everywhere abundant there in such situations. I have taken it at Lindsay, in the station there, Porterville, Bakersfield and also have it from Coalinga (Fresno County). It not only lives on plants, but is also frequently found in the corners of porches, the web being not unlike that of *Pholcus phalangoides* Fuess. Banks (Proc. Calif. Acad. Sci., vol III, p. 352, 1904) records it from Claremont and Zebra (Madera County).

Advices to the States Department from Consul General Guenther at Frankfort, indicate that a real preventive of mosquitoes has been found. He says: "The director of fisheries at Diebrich, has, after experiments covering a period of fourteen years, found that the most reliable means against mosquitoes in stagnant waters is the growing of the various kinds of the semi-tropical plant arzola.

"The plant suffocated all the mosquito larvae below and prevented the living insects from depositing their eggs in the water."

A New Euceros.

By P. H. Hertzog, Bucknell University, Lewisburg, Pa.

EUCEROS Gravenhorst (**EUMESIUS** Westwood).

Table for Determination of Species.

Posterior tibiae black or dusky, yellow at base.
  Coxae, femora and abdomen rufous . . . . . **frigidus** Cress.
  Coxae black to yellow.
    Abdomen, except basal segment, rufous . . . . . **couperii** Cress.
    Abdomen black, with apical half of all the segments yellow, stigma black; scutellum at base and most of hind coxae yellow. **obesa** Davis.
    Abdomen varied; stigma rufous.
      Black and yellow and always with a more or less distinct median longitudinal yellow stripe; hind coxae and scutellum at base mostly black . . . . . **canadensis** Cress.
      Brown, almost black along margin; yellowish stripe on segments 1-4 not distinct . . . . . **vierecki** n. sp.
Posterior tibiae rufous, sometimes yellow at base.
  Hind tarsi rufous, with median segments yellow; wing very dark at apex . . . . . **sanguineus** Davis.
  Hind tarsi unicolorous, wings faintly dusky at apex.
    Sternum lemon yellow.
      Notum black and yellow . . . . . **thoracicus** Cress.
      Notum and abdomen dark rufous . . . . . **facieus** Davis.
    Sternum color of the remainder of thorax.
      Abdomen fulvous, with more or less distinct, transverse yellow spots; thoracic vittae yellow . . . . . **medialis** Cress.
      Abdomen and thorax uniform bleached fulvous . **flavescens** Cress.

Euceros vierecki n. sp.

♂ differs from *Euceros canadensis* Cress., as described on page 254 Trans. Am. Ent. Soc. XXIV, by Mr. G. C. Davis, in having the hind coxæ uniformly black underneath and inner portion as well as above; sternum black; pleura black with distinct yellow markings; antennae black, fulvous at apex and are only slightly enlarged in middle; median yellowish stripe on segments 1-4 not distinct; there are no black cross bands on the abdomen. The general color of the abdomen is brown, almost black along the margin and yellowish median stripe. Length, 10 mm.; wing, 9 mm.

Type Locality.—Harrisburg, Pa., June 13, 1908 (P. H. Hertzog).

Type will be deposited in the collection of the American Entomological Society, Philadelphia, Pa.

In running the specimen over the table prepared by Mr. Davis in reference quoted above, it readily traces as far as *E. canadensis* Cress. In the description of *canadensis* there are many characters in common to *vierecki*. But the differences pointed out in the comparative description are decidedly too marked to pass under the same species. The table or key in this paper is practically in substance that of Mr. G. C. Davis, but the first group has been entirely rearranged and partly changed so as to show the relation more clearly as well as to simplify the arrangement and incorporate the new species.

One male was caught while it was flying about some weeds

Euceros vierecki Hertzog.

mostly *Ambrosia trifida* L. A number of Braconids and Ichneumon-flies were in its company. This seems to indicate that the species no doubt is a beneficial parasitic insect. Of European species it may be noted that *E. crassicornis* Grav., is parasitic on *Cidaria barberaria* and *Thecla quercus* and *E. superbus* Kriechb., is parasitic on *Callimorpha dominula.*

It gives me great pleasure to dedicate the species to Mr. H. L. Viereck of the Bureau of Entomology, Washington, D. C., who has given me much encouragement in the study of Hymenopterous insects. The illustration is due to the kindness of Mr. W. R. Walton, Harrisburg, Pa.

Descriptions of the New Cynipidae.

By William Beutenmuller.

Rhodites nodulosus sp. nov.

Female. Head, black, opaque, finely and evenly rugoso-punctate, with scattered whitish hairs. Antennæ wholly black and pubescent. Mandibles rufous, black at the tips. Thorax subopaque, with rather large coarse punctures. Parapsidal grooves broad, not deep and rugose. Median groove from the scutellum broad, not deep and extending forward to nearly the ends of the parallel lines. These are almost smooth, somewhat shining and scarcely reach the middle of the mesonotum. Lateral grooves very fine and scarcely evident. Pleuræ finely and densely rugoso-punctate with a large shining area. Scutellum well rounded posteriorly, evenly rugose and without foveæ at the base. Abdomen, red; anal segments, black or blackish; ventral sheath, jet black; first and second segments, smooth, remaining ones rather densely covered with short decumbent hairs on the dorsum and sides. Venter, smooth and without hairs. Legs, reddish and pubescent. Wings, yellowish hyaline, radial area darker than the rest of the wing. Veins dark brown, cross-veins heavy. Areolet present. Cubitus distinct and extending to the first cross-vein. Length, 3 to 4 mm.

Gall.—On the two tender twigs of wild rose (*Rosa lucida?*) It is an elongate, slight swelling of the branch and sometimes scarcely distinguishable from the rest of the branch. Inside is a single, short, elongate chamber inhabited by a single larva, which when fully grown fills almost the entire chamber. Length, 8 to 12 mm.; width, 2 to 4 mm.

Habitat: Magnolia, Massachusetts (Miss Cora H. Clarke); Evanston, Illinois (Lewis H. Weld).

A large and distinct species, allied to *R. dichlocerus,* but with the color of *R. rosae, ignota* and *bicolor.* The galls were kindly sent to me by Miss Cora H. Clarke and Mr. Lewis H. Weld. They were collected in March and April. The flies began to emerge about April 20 until early in May. The gall is sometimes an imperceptible swelling of the branch and may be easily overlooked.

Andricus aciculatus sp. nov.

Female. Head, rufous; opaque, evenly granulated and with distinct whitish hairs. Antennæ fifteen-jointed, rufous, darker terminally, pubescent. Thorax rufous, black along the lateral grooves and between and around the anterior parallel lines, densely and finely rugoso-punctate, with yellowish hairs. Parapsidal grooves, broad, distinct,

smooth, and rather widely separated at the scutellum. Anterior parallel lines distinct, not quite reaching the middle of the mesonotum. Median groove from the scutellum, short. Lateral grooves very broad, shining and extending well forward. Pleuræ rufo-piceous, finely rugose and pubescent. Scutellum, rufo-piceous, rugose, pubescent, foreæ at base oblique, shining and scarcely separated by a fine carina. Abdomen opaque, piceous, narrowly rufous at the posterior ends of the segments, distinctly longitudinally aciculated. Legs rufous, pubescent, posterior femora and tarsi piceous. Wings hyaline, veins dark brown. Areolet large, triangular. Cubitus rather delicate and scarcely reaching the first cross-vein. Length, 2.50 to 3 mm.

Gall.—On the side of a twig of post oak (*Quercus minor*) in March. Polythalamous. Elongate, irregular, hard and woody swelling, with the base broadly attached to the twig. Covered with a compact mass of white wooly substance, which is sometimes tinged with red or brown. The wool forms a rounded or almost globular mass on one side of the branch. Length, 15 to 20 mm. Diameter, 12 to 20 mm. Height, 10 to 16 mm.

Habitat: College Station (Glenn W. Herrick), and Austin, Texas (C. Hartman).

Andricus texanus sp. nov.

Female. Head, rufous, very finely and minutely rugose, with distinct pale hairs. Antennæ, fourteen-jointed, dull rufous basally, dusky terminally. Thorax, dark rufo-piceous or almost entirely piceous. Parapsidal grooves rufous, distinct and converging at the scutellum. Median groove wanting. Anterior parallel lines distinct and extending to the middle of the mesonotum. Lateral grooves wanting. Scutellum rufo-piceous, rugoso-punctate, foveæ at base rather large and rounded. Abdomen smooth, polished, piceous. Legs yellowish brown, femora and tibiæ usually somewhat infuscated, pubescent. Wings hyaline, ciliate, veins brown, cross-veins heavy, cubitus very delicate. Areolet present, distinct. Length, 1.50 to 2 mm.

Gall.—In clusters, closely packed together, on the under side of the leaves of post oak (*Quercus minor*). Monothalamous. Hard, woody subcylindrical, wedge-shaped or subtriangular, sometimes more or less flattened, pointed basally at the place of attachment to the leaf. Each individual gall is densely covered with short, coarse, whitish, wool-like fibers. They are closely packed together on the leaf and have the appearance of being one large gall, but each gall may be readily separated and detached. When old the fibers turn brown and the galls drop to the ground.

Habitat: Austin, Texas (C. Hartman), and College Station, Texas (Glenn W. Herrick).

A new Genus and a new Species of North American Phloeothripidae (Thysanoptera).

By J. Douglas Hood, Urbana, Illinois.

Genus **LEPTOTHRIPS** nov.

(λεπτος, narrow; φριψ)

Body unusually slender. Head long, narrow, nearly twice as long as broad, widest across eyes, narrowed at base. Eyes finely faceted, prominent, bulging, projecting beyond the general outline of the head. Vertex elevated, conspicuously prolonged, overhanging the insertion of the antennæ, and bearing the anterior ocellus at its extremity. Mouth cone moderately short, about as long as its breadth at base, reaching nearly across prosternum; labrum subacute. Antennæ eight-segmented; sense cones small, weak. Prothorax about half as long as head; spines short, blunt, scarcely visible; mid-laterals wanting. Legs slender; fore femora not enlarged; tarsi unarmed in both sexes. Wings slender, not very closely fringed, distinctly narrowed at middle. Abdomen long and slender, about three and one-half times as long as wide.

Type: *Cryptothrips aspersus* Hinds.—In this genus will also be placed a new species from Madeira, soon to be described by Mr. R. S. Bagnall.

From *Liothrips* Uzel, which should precede it in a linear arrangement of the genera, and in which should be placed the three North American species, L. (?) *ocellatus* m., *Phyllothrips citricornis* m. and *P. umbripennis* m. *Leptothrips* may easily be distinguished by the much slenderer form, the longer head, the more bulging eyes, the shorter mouth cone, and the weaker, slenderer wings, which are distinctly narrowed at middle. Furthermore, in five species of *Liothrips* which I have had the opportunity to examine, the double fringe on the hind margin of the fore wings consists in every case of about thirteen hairs, while in *Leptothrips aspersus* the number never exceeds seven. It might also be added that the latter is much more difficult to mount satisfactorily, the legs and antennæ almost always tending to assume some awkward

position which is frequently most trying to the skill and patience of the collector.

It is to be regretted that the name *Phyllothrips* m. can no longer be used for this insect*; it must fall into synonomy, for its type species, *citricornis* m., turns out to be nothing more than a slightly anomalous *Liothrips*. In fact, at the time of describing the genus *Phyllothrips*, I realized that my *citricornis* was very close to the European species of *Liothrips*, and would have designated *Cryptothrips aspersus* Hinds as the type species had I been certain of my identification. But I was misled by Dr. Hinds' figure (Plate X, Fig. 104), in which the sides of the head are incorrectly represented as parallel to one another. A more accurate idea of the shape of the head may be gained by reference to ENTOMOLOGICAL NEWS, Vol. XX, No. 1, p. 32, Fig. 4; January, 1909.

I must acknowledge my indebtedness to Mr. Bagnall who, upon receipt of type specimens of *P. citricornis* m. and *P. umbrippennis* m., wrote that although he was glad that I had removed *aspersus* from the genus *Cryptothrips* Uzel, he feared that *Phyllothrips* could not stand, and suggested that I propose a new genus name for the reception of Hinds' species.

Genus **PHLOEOTHRIPS** Haliday, 1836.

Phloeothrips maculatus sp. nov.

Female.—Length, about 1.6 mm. Body, flattened. Dorsal surface, microscopically granulate; ventral surface, smooth. General color (by reflected light), dark mahogany brown, with many small white blotches; as follows: A fusiform blotch extending from eye to base of head, and followed posteriorly by several others which form an interrupted vitta, reaching well along the sides of the metathorax; dorsum of abdomen margined with a band of white spots which is about equal in width to the fore femora, and which extends around the apex of the abdomen, traversing segment 9; in this band, on each side of segments 2-7, are three more or less fused spots, the inner one largest and more or less crescent-shaped; mesoscutum with a pair of quadrate blotches near the middle; metathorax with a pair of smaller blotches situated

* Buffa's genus *Phyllothrips*, described in Redia, Vol. I, Fas 1, p. 123 (Dec., 1908) must of course also be dropped, being preoccupied by *Phyllothrips* m. (Can. Ent. Vol. XL, No. 9, p. 305; Sep., 1908.)

laterad of the metascutellum; antennal segments 1 and 2 marked with white; fore femora marbled dorsally with white; femora of second and third pairs and all tibiæ, with an apical white blotch. General color (by transmitted light), blackish brown, with maroon hypodermal pigmentation; antennal segments 1 and 2 nearly concolorous with body; segments 3 and 5 yellow, the former clouded near apex with gray; segments 4, 6, 7 and 8 nearly black, 4 and 6 with their pedicels yellow; extremities of tibiæ nearly transparent.

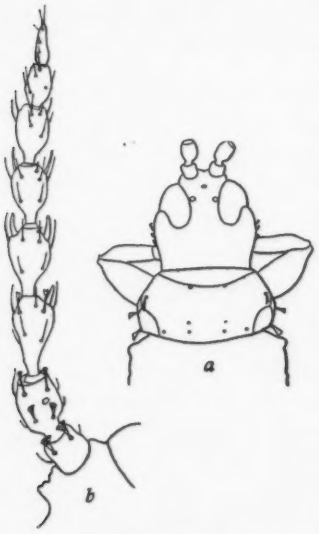


FIG. 1.—*Phloethrips maculatus* sp. nov. Female, a—head, prothorax and forelegs, x 67; b—right antenna, x 172.

Head about as wide as long; cheeks swollen, dorsal and lateral surfaces with many short subclavate spines; postocular bristles wanting. Eyes reniform, finely faceted. Ocelli present, moderate in size. Antennæ about one and three-fourth times as long as head; fully developed sense cones on segments 3 and 4 large, stout; those on segments 5-7 moderately slender; formula*: 3, 0-1; 4, 1-1 1; 5, 1-1 1; 6, 1-1 1; 7 with one on dorsum near apex; segments 1-3 with infundibuliform bristles. Mouth-cone large, attaining base of prosternum; labium broadly rounded and slightly surpassing the labrum, which is narrowed at apex.

Prothorax nearly .6 as long as head, and (including coxæ) about 2.4 times as wide as long; spines dilated apically, scarcely visible.† Pterothorax wider than prothorax and slightly wider than long; sides subparallel for half their length, then roundly converging to base of abdomen. Wings present, reaching base of tube. Legs rather short and stout; fore tarsi armed with a small acute tooth.

---

*The explanation of the formula for the antennal sense cones has been given in Ann. Ent. Soc. Am., Vol I, No. 4, p. 285, and in Ent. News, Vol. XX, No. 1, p. 29, foot note.

6, 1-1 1; 7 with one on dorsum near apex; segments 1-3 with infundi-

†The prothoracic bristles are so nearly transparent that they can be seen only after a very careful adjustment of the light. In the figure, the bases of several have been shown, although the bristles themselves could not be made out.

Abdomen large, slightly wider than pterothorax, narrowing arcurately from segments 5 to base of tube. Tube .9 as long as head and of nearly equal diameter throughout, excepting for a very slight widening at apical third and a slight subapical constriction; terminal bristles pointed, half as long as tube. Marginal abdominal bristles dilated at apex.

Measurements: Total length, 1.58 mm.; head length, .24 mm.; width, .24 mm.; prothorax length, .14 mm.; width (including coxæ), .33 mm.; pterothorax width, .38 mm.; abdomen width, .45 mm.; tube length, .22 mm.; width at base, .059 mm.; at apex, .038 mm. Antennæ: 1, 43 μ.; 2, 59 μ.; 3, 73 μ.; 4, 64 μ; 5, 57 μ.; 6, 53 μ.; 7, 43 μ.; 8, 42 μ.; total, .43 mm.; width, 42 μ.

Described from a single specimen taken by the writer under rotting poplar bark, near Baldwin, Michigan, August 8, 1908.

This pretty species is the only one of its genus with white pigmental markings. The broad head, reniform eyes, and funnel-shaped bristles are also characteristic.

Some Observations in Southern Pines, N. Carolina.

By Abram Herbert Manee, A. M.

SCARABAEIDAE

Canthon probus.—March 27-July 24. In roads, abundant. Appears *instantly* to fresh human or horse or cow excrement.

Canthon nigricornis.—March, May, June. Not common.

Canthon vigilans.—April. Not common.

Canthon laevis.—March, April. Not uncommon.

Deltochilum gibbosum.—Only fragment of one specimen.

Choeridum histeroides.—May. Very abundant. Shallow burrows, under horse and cattle droppings.

Copris minutus.—June, October. Not uncommon in or under *dried* horse or cattle droppings.

Copris anaglypticus.—March. Very rare. Smaller than same species in New England.

Copris carolina.—April, July, October. Not uncommon. Burrows very deep in roads and cow yards.

Phanaeus carnifex.—April to late June, August. Not uncommon. In human, horse and cow excrement.

Phanaeus igneus.—June to September. More abundant than *carnifex.* In horse and cow excrement.

Onthophagus hecate.—March. Very rare.

Onthophagus janus.—June 29. Very rare in foetid toad stool.
Onthophagus orphaeus variety, *subaeneus.*—April. Rare. Horse and cow excrement.
Onthophagus tuberculifrons.—May, October. Very abundant. In roads.
Onthophagus pennsylvanicus.—April, July. Not uncommon. In roads.
Aphodius fossor.—Very rare.
Aphodius fimetarius.—October. Rare.
Aphodius ruricola.—April, December. Not common.
Aphodius lividus.—October. Not common.
Aphodius inquinatus.—October, November. Not common.
Aphodius rubeolus.—Very rare.
Aphodius stercorosus.—Rare.
Aphodius lutulentus.—October to January. Not uncommon.
Bradycinetus ferrugineus.—June 5 to middle August. Rare, except as haunts are found. (See Ent. News, Vol. XIX, pp. 459-460.)
Bolbocerus lazarus.—June to September. not uncommon. (See Ent. News, Vol. XIX, Plate XXI.)
Geotrupes blackburnii.—January to December. Common.
Geotrupes balyi.—June. Not common.
Trox scabrosus.—August, October. Not common. In privies and hoof parings.
Trox insularis.—January. Rare. In feathers.
Hoplia tivialis.—Late March, 1905. Very rare.
Serica iricolor.—April, May. Not common. On oaks.
Macrodactylus subspinosus.—June 8, 1907. Two specimens.
Diplotaxis liberta.—June. Very rare. On young loblolly pines.
Diplotaxis rugosioides.—November. Rare. On young long leaf pines, late afternoon.
Diplotaxis subcostata.—April, May. Not common. On gummy oak buds at twilight, P. M.
Diplotaxis bidentata.—July. Rare.
Diplotaxis Species?—March. Very rare. Size of *bidentata,* color of *subcostata.*
Lachnosterna gracilis.—April, June, August. Not common. Taken only at light.
Lachnosterna fusca.—April, July. Common.
Lachnosterna micans.—January in ground. April and June at light and flies low from 8 to 10 P. M. Not common.
Lachnosterna praetermissa.—Early April. Not uncommon. Flies at 4-5 P. M. among gummy oak buds.
Lachnosterna pronunculina.—July. Very rare.
Lachnosterna ilicis.—June. Rare. Flies to gummy acorns, 7 to 8 P.M.
Lachnosterna barda.—Late May. Very rare.

Lachnosterna luctuosa.—Late May. Very rare.

Lachnosterna tristis.—April. Abundant. Flies at 6 to 8 P. M. to gummy oak buds.

Polyphylla occidentalis.—Late June, July. Not uncommon. Among needles of young pines.

Anomala flavipennis.—June, 1905. Very rare.

Anomala undulata.—April. Rare.

Anomala oblivia.—Early June. In 1908 not uncommon. Among needles of young loblolly pine.

Anomala minuta.—July. Not uncommon. Rises at 4 to 5 P. M. to top of wire grass.

Strigoderma pygmaea.—Middle June, early July. Not uncommon. On wire grass, 10 A. M. to 12 M.

Pelidnota punctata variety *notata.*—Late June, July. Not uncommon on grape vines. Flies at early night.

Cyclocephala immaculta.—Late June to middle August. Not common. Only at light.

Dyscinetus trachypygus.—June. Rare. Under boards in wet banks.

Ligyrus gibbosus.—June, July. To light. Common.

Aphonus castaneus.—July. At light. Rare.

Xyloryctes satyrus.—September 13, 1905. One male.

Strategus antaeus.—June 15 to middle August. Not uncommon. (See Ent. News, Vol. XIX, pp. 286-288.)

Strategus splendens.—January 1. In ground. May to June. In wood paths at dark. Rare.

Dynastes tityrus.—June 29 to late August. In orchards on ripe fruit.

Phileurus truncatus.—August. To light. Very rare.

Phileurus valgus.—December, '04-December, '05. In decay of hickory. January, '09. In decay of tulip tree.

Allorhina nitida.—Middle June to August. Common. Flies about oaks by day. Larvae about compost. Crawls on back in Winter.

Euphoria areata.—January to April. In paths and roads. Common.

Euphoria melancholica.—April, June, August. Common. On gum of oak stump sprouts.

Euphoria inda.—September. Not common. On gum of persimmon, girdled by *O. cingulata.*

Cremastochilus squamulosus.—May, July. Rare.

Trichius piger.—May, June. On *Ceanothus americana.* Common.

Trichius delta.—May, June. On *Ceanothus americana.* Not uncommon.

Trichius viridulus.—May, June. On *Ceanothus americana.* Rare. Three varieties. Bright green, blue, black and dark chestnut.

Valgus squamiger.—October 16, 1908. On dead bark of live hickory. January 22, 1909. On decayed oak stump. Not uncommon.

Aphid technique.*

By Paul Hayhurst.

Plant lice and similar soft-bodied insects are often considered difficult objects to preserve permanently in good condition. They cannot, of course, be pinned, for their dried bodies give little or no idea of what the real insect is. On the other hand, strong alcohol is apt to cause considerable shrinkage and the appendages become more or less brittle and easily broken. Large specimens are not so much injured as the smaller forms, which usually shrink badly. The more delicate species frequently lose much of their pigment, especially in the abdominal regions. Shrunken or distorted material is valueless for accurate measurements and is often so unsatisfactory in other respects that specific determination becomes a matter of conjecture. Alcohol is therefore rarely used by some investigators who mount most of their specimens for permanent preservation. It is, however, an evident advantage to be able to put up plenty of material quickly and easily, but if all the insects must be mounted as they are collected, comparatively few can be kept of each species. This is inadvisable, since to describe a form properly many specimens must be examined to note the variations in size, structural characters and markings, for then it is probable that fewer species would be manufactured.

An ample supply of specimens is also a real privilege in making mounts, and it allows exchanges with other workers. Mounting aphids in balsam is, furthermore, a great nuisance on a collecting trip. If a field agent must carry such slides with him as he goes from town to town, some of them at least are liable to be ruined in transit before the balsam sets, unless it is first hardened by heat. My own material preserved in the usual way has been so unsatisfactory that I have recently given considerable attention to the technique and consequently I now find my specimens in suitable condi-

*Contributions from the Entomological Laboratory of the Bussey Institute, Harvard University. No. 3.

tion for study. I do not present this paper as an original contribution to scientific literature, but I hope that it may be helpful to entomologists who have not given special attention to this group.

I believe that the most satisfactory way to preserve aphids for general purposes is to keep them permanently in 70 per cent. alcohol. It is advisable, however, to put the more delicate species in 35 per cent. for several hours before transferring them to 70 per cent. In this strength there is very little, if any, shrinkage. All species remain comparatively soft and the appendages more flexible and less liable to break than in 95 per cent. alcohol. Good mounts can be made with them at any convenient time. Alcoholic specimens should be kept in three or four times their bulk of fluid. If too many aphids are put in a vial, the alcohol will become weaker than 70 per cent. and may not be strong enough to preserve them permanently. If it is necessary to keep a large number of insects in one vial, the fluid should be changed once or twice a few hours after they are put in. Mr. Theo. Pergande, of the U. S. Department of Agriculture, Bureau of Entomology, advised this percentage in a letter to me, dated October 23, 1906.

Aphids preserved in about 2½ per cent. formalin can be absolutely depended on not to shrink. If they are fixed in hot water at about 80 degrees C. and are pricked when sufficiently hard and are kept in the dark, they will partly retain their normal color and have the advantage of looking much like the real living insects. They cannot be pricked while fresh without losing some of their contents and thus affecting their shape. Fine sewing needles (Sharps No. 12) are suitable tools for pricking small aphids. All forms can be readily submerged, if they are first passed through 95 per cent. alcohol to remove waxy secretions and to dampen the entire external surface and thus prevent the formation of a film of air around them when the formalin is poured on. They must not be left more than a very few minutes in the alcohol. These specimens will always be good material for

measurements and should be kept as checks on the alcoholic aphids, which may shrink a little.

After a comparative test of nearly two years I cannot see that the addition of a little glycerine to the formalin has kept the appendages any more flexible than has 2½ per cent. formalin. The glycerine may delay the hardening effect a little while, but as a permanent preservative does not seem superior to formalin alone, and is not likely to be so clean.

If special study is given to a species, it is well to fix some specimens in water at about 80 degrees C., then leave them several hours in 35 per cent. alcohol before transferring them to 70 per cent. for permanent preservation. As soon as sufficiently hardened they should be pricked. Such material is excellent for the study of some structures that might ordinarily be retracted, since the bodies remain very plump and the abdomens are slightly distended.

I like to keep my unmounted collection, for the most part, in 1 dram homeopathic vials, because the specimens are so easily accessible with a wide-mouthed pipette or forceps. Smaller vials than 1 dram do not have sufficient capacity for more than a very few specimens and, if round-bottomed, are a constant annoyance.

When sent in fluids by mail the insects are liable to be received devoid of the normal number of appendages and are almost as unfit for determination as aphids sent, like so many flowers, in a letter. The best way to mail specimens in fluids is to crowd them securely in place with a wad of lens paper. Space can be allowed for the labels above the paper. Other things then being equal the insects will reach their destination in good shape. Cotton is not so useful as lens paper because the appendages will be entangled with the fibers.

It is necessary to mount plant lice for detailed study with a compound microscope. To secure good mounts with little or no shrinkage, specimens taken from the stock collection in 70 per cent. alcohol, are first pricked in the abdomen to secure thorough dehydration; they are then transferred to 95 per cent. for several hours, and are next placed in absolute to

prepare them for xylol in which they are cleared, and after a few minutes are mounted in Canada balsam. It is convenient to support the cover glass on wax feet, which are made by mixing beeswax with a little balsam and lampblack. In this way a specimen can be fixed in any desired position by adjusting the cover glass. Bits of broken glass are sometimes used instead of wax feet, but they are not so desirable because they do not yield to pressure. If the specimens are not pricked, or if they are cleared in anything containing carbolic acid, they are liable to shrink badly. If thorough dehydration is not secured, the specimens will collapse completely and turn whitish. Material properly dehydrated and cleared will become still clearer in time. Too much clearness is a disadvantage, since a certain opacity is more easily studied. To avoid this it is advisable to pass the pricked specimens from 70 per cent, to water, then stain several hours in alum cochineal, dehydrate gradually, clear and mount in balsam. Such specimens are opaque enough, and more or less of the internal structure can be traced. Or, if preferred, they can be stained directly from 70 per cent. in Grenacher's borax carmine. Unstained mounts can be made without clearing by passing pricked specimens from 70 per cent. alcohol to water and mounting in Farrant's medium. This medium becomes hard much quicker than balsam, but has the disadvantage of holding bubbles permanently. It does not require sealing. These mounts are clear enough for many purposes and will never become too clear. If the procedure is properly carried out, they will not shrink.

Pure gylcerin is a good medium for making temporary mounts from water. If pricked aphids are mounted from water in glycerin jelly and the cover glass is completely sealed with shellac, they will last a long time. This medium is rarely used now by histologists except for temporary mounts, as the objects are likely to be disappointing after a time and sealing is troublesome.

A very common method of mounting aphids is to put them fresh in balsam without dehydration. Although this has

some advantages, there are so many objections that I do not use it. Some of the pigment is always drawn out of the body and stains the balsam. If the atmospheric conditions are unfavorable at the time of mounting, the surface will be obscured by a cloud caused by moisture. Although such mounts do finally "clear up" to a certain extent, they are never entirely satisfactory and shrinkage is apt to occur after a time. They are rather shocking to a person used to modern technique. Closely related species thus mounted are often scarcely distinguishable. This method of mounting is precisely that used by nature in the Tertiary period in the formation of the amber specimens.

In collecting aphids I find that small tin boxes with tightly fitting covers are most convenient. Infested leaves are trimmed of uninfested parts and placed in a box. If the cover does fit closely, the leaves and the insects will not dry up in less than 24 hours; thus the collector has time to make notes and preserve plenty of material on returning to the laboratory. They can be quickly chloroformed in the box and thus the nuisance of crawling plant lice may be avoided. But it is not safe to use chloroformed material for color notes. These are best made with living examples held in place under a cover glass and examined with a high power hand lens. Mr. C. E. Sanborn has published a guide for taking notes of living aphids (U. S. Dept. of Agric. Bur. Ent. 60 (n. s.) p. 165). This prevents omissions and secures uniformity so that related forms can be easily compared. But the only satisfactory means of recording the color is by colored drawings of living insects. Needless to say they are far better than mere words, which, however, have to suffice in general collecting.

Considerable information is obtained on the habits and development of aphids by insectary breeding experiments supplemented with field observations. To enable the insects to attain their normal size they must be allowed to develop on freshly growing plants. These can be secured for indoor

studies by potting healthy specimens. To prevent accidental injury and to keep away parasites, which may enter through the open doors and windows, the plants can be covered with Welsbach chimneys, whose upper end is closed with Swiss netting. Yet even with the greatest care an experiment in individual breeding occasionally fails through the mysterious disappearance of the insect. This is undoubtedly because the aphid becomes restless, if the supply of food is not perfectly satisfying, and wanders down and is lost in the apparatus. Therefore, if the observer notes that a certain number of young larvae are with the adult, he knows that she produced this number since the last record was made, but he cannot know how many more were born that wandered away and were lost. Consequently, if absolutely reliable data are to be secured, each insect must be confined so that, if it dies, it can be easily found. For this purpose I have used successfully glass tubing of a large diameter. The portion of the potted host carrying the insect is placed in the tube, which is securely held in place by attaching it to a stick thrust in the soil. The upper end is closed with fine netting, and the lower end is plugged with cotton, to prevent the escape of the insect along the plant stem. If black cotton is used, any light-colored plant louse or exuvium that falls on it will be easily seen. By using succulent, healthy plants and reasonable care, reliable results can thus be obtained. If the apparatus is kept in diffuse daylight and not too much plant tissue is placed in the tube, moisture and fungi will not be especially troublesome. Mr. J. J. Davis has secured the individual life history of *Aphis maidi-radicis* by using large glass vials as vivaria in which the plant is kept growing with a ball of moist cotton at the bottom. (U. S. Dept. Agric., Bur. Ent., Tech. Ser., No. 12, Pt. VIII, p. 124-5.)

I believe that by giving careful attention to the proper methods the Aphididae can be studied as advantageously as any other group of insects. I wish to acknowledge Professor Wheeler's kind criticism in the preparation of this article.

Some Anthidiine Bees.

By T. D. A. Cockerell.

HETERANTHIDIUM Ckll., 1904.

To this genus must be added *Heteranthidium occidentale* (*Anthidium occidentale* Cresson) and *H. zebratum* (*Anthidium zebratum* Cresson). Mr. S. A. Rohwer has taken *H. zebratum* at Boulder, Colorado, during the latter part of August, at flowers of *Helianthus pumilus*.

Dianthidium inerme (Friese).

Anthidium inerme Friese, 1908. Mendoza, Argentine. I am indebted to Dr. Friese for a specimen.

Dianthidium zebra (Friese).

Anthidium zebra Friese, 1904. Willowmare, Cape Colony. My specimen is from Dr. Brauns.

A. braunsi Friese has no pulvillus, and belongs to *Anthidium*.

Dianthidium siculum (Spinola).

Anthidium siculum Spinola, 1838. My specimens are from Tangier and Rabat, Morocco.

Dianthidium ulkei (Cresson).

A series from Colorado and New Mexico, which I have hitherto referred to *D. parvum* (Cress.), includes two distinct things, the commoner one being *D. ulkei*. This is readily separated from *D. parvum* and other allies by having the tibiæ on the outer side wholly yellow in both sexes. The seventh segment of the male abdomen is broadly truncate, yellow with the edge hyaline, the lateral corners rounded, and the small median projection not bounded by notches. The hind coxæ have yellow spines. In the female, the dot above clypeus, and those behind the ocelli, mentioned in Cresson's description, are more often absent than present. The specimens of *D. ulkei* before me come from the following places: Campus of University of Colorado, Boulder, Colorado, July 15 (*Ckll.*); Boulder, Colo., at flowers of *Grindelia serrulata*, Sept. 3 (*Ckll.*); S. Boulder Canon, Colo., at *Grindelia*, Aug. 9 (*Ckll.*); Raton, New Mexico (*W. P. Ckll.*); *Pecos*, New Mexico (*T. D. A.* & *W. P. Ckll.*).

Genuine *D. parvum* comes from Florissant, Colorado at *Erigeron,* June 21 (*S. A. Rohwer*); Las Vegas, New Mexico, June 15 (*N. E. Cochran*); and Dripping Spring, Organ Mts., N. M., August (*Ckll.*).

Anthidium conspicuum Cresson.

This fine species has hitherto been known only in the female. Last year I obtained two males at Boulder, Colorado, July 15 (on campus of University of Colorado) and July 16. The male resembles the female very much, with the exception of the usual sexual differences. The following characters are diagnostic: Clypeus and lateral marks pale yellow, the latter broadly truncate above at the level of the antennæ; antennæ entirely black; yellow band on vertex reduced to a large stripe on each side above eye; hair of head and thorax above very slightly ochreous; thorax with very little yellow, tubercles with yellow spot, mesothorax with a pair of small yellow spots in front, scutellum with a pair of yellow marks; seventh abdominal segment yellow with a median black spine and narrow brown margin, the lateral lobes pointed. This is very distinct from the male of *A. illustre,* and comes nearer to *A. serranum.* The following table separates the three males:—

Middle of seventh abdominal segment with a shining tubercle, but no distinct spine; clypeus with a large cuneiform black mark. **illustre** Cress.

Middle of seventh segment with a short spine; clypeus with a large cuneiform black mark . . . . . **serranum** Ckll.

Middle of seventh segment with a rather long spine; clypeus without a black mark . . . . . **conspicuum** Cress.

Anthidium pondreum Titus, var. a.

♂ Seventh abdominal segment entirely black. This is in all other respects a normal *A. pondreum;* the sixth segment has a very broad, bright yellow band, notched in the middle, and the tibiae are mainly yellow on the outer side. It seems possible that the insect may be a hybrid between *A. pondreum* and *A. tenuiflorae* Ckll.

Hab.—Campus of University of Colorado, Boulder, July (*W. P. Cockerell.*) I have normal *pondreum* from Boulder and Jim Creek, Boulder County, collected by Mr. A. M. Hite.

New South American Butterflies.

A. G. WEEKS, JR.

Carystus benchos sp. n.

Head, palpi, thorax, abdomen and legs, dark reddish brown, lighter beneath. Antennae, dark brown with white annulations at base of each joint, tip white at base, black at end. Upper side of fore wing rich blackish brown. Apex dashed with white. Across discoidal space, near its end is a prominent transparent white band or mark, and below it in first submedian interspace, but nearer margin, is another of similar size. In interspace below this and midway to base at junction of median nervure and nervule is a third transparent spot of similar size. In apical area semi-distant between the first two spots and apex is a small well defined transparent white spot, nearly circular. Hind margin has slight fringe of lighter color. Upper side of hind wing the same ground color as fore wing, with no markings except two minute but distinct transparent spots or dots midway between end of discoidal space and hind margin. Fringe very light brown approaching white at center. Upper side of fore wings dark brown, nearly black in basal area. The four transparent white spots same as above. Near the apex, in the first seven interspaces below costa are dashes of bluish gray. In the two interspaces below the apical dot, and under the dot are also two similar dashes. The white dash appearing at apex on upper surface is wanting on under side. Under side of hind wings, dark rusty brown with scattered whitish scales. The two transparent dots are encircled with very dark brown extending somewhat, in linear form, towards anal angle. Fringe the same as on upper surface. Expanse, 2 in.

Habitat: Bolivia, two hundred miles north of Cochabamba.

This species was supposed to be *C. basoches* Linn ♀ but it is not. It is not represented here or in English collections.

Taken about five days travel north from Cochabamba in August.

Callimormus elides sp. n.

Upper side of head, palpi, thorax and abdomen dark brown; beneath, nearly white. Antennae dark brown tipped with black. Upper side of fore wing dark brown. Near the apex are two clear but small subcostal white dots. There are also three subcostal white dots, almost imperceptible, nearly midway from the first mentioned and the base. In the submedian interspace in the centre of the wing are two distinct white spots, the upper and smaller one being nearer the hind margin but touching the larger spot below it. The hind margin has a

very slight fringe of ground color. Upper side of hind wing dark brown without markings. Under side of fore wing dark brown but much lighter than upper surface. There is a tendency to lighter shading towards apex. The subcostal spots are the same as on upper surface, but the spots nearer base are more prominent. The two submedian spots are also repeated, the lower one suffusing slightly towards the inner margin. Under side of hind wing dark brown with a suggestion of rust color, the basal area of lighter color with a blotch of the ground color near the costa. In the outer wing area is an irregular light band of basal area color, somewhat ill defined, extending from near the centre of inner margin to a point a little below the upper angle, nearly imperceptible as it approaches angle. Expanse, 1 inch.

Habitat: Suapure, Venezuela.

One specimen is in the British Museum, unnamed.

Atrytone chingachgook sp. n.

Head and palpi above, dark brown; beneath, white touched with rust color. Antennae dark brown tipped with rust color. Thorax and abdomen dark above, dark brown; beneath, a lighter brown. Upper side of fore wing, dark brown matching thorax. Near apex, in interspaces below the costa, are three or four rust colored spots, extending in a line downwards in the direction of lower angle, followed by three larger whitish spots running in a line and increasing somewhat in size towards base, the whole forming an imperfect semi-circle around the end of discoidal space. Margin slightly fringed with dark brown hairs.

Upper side of hind wing dark brown without markings, matching ground color of fore wing. Marginal fringe the same. Under side of fore wing shows spots as on the upper surface. The apical area and costa rust color. The area below the median nervure and to the lower angle is dark mouse color, approaching black near the base. Under side of hind wing rust color. From upper angle extending across the wing to centre of inner margin is an indistinct lightish line or band, dusted with rust color and more or less prominent on different specimens. Slightly nearer base is another similar line reaching inner margin midway between termination of first band and the base. Expanse, 1.12 inches.

Habitat: Suapure, Venezuela.

This species is not represented in the Strecker and other collections, nor in the British Museum, etc.

D. L. VAN DINE has moved from Hawaii Agricultural Experiment Station, Honolulu, to Dallas, Texas, P. O. Box 208.

Notes on some New Jersey Lepidoptera.

By Herman H. Brehme, Newark, New Jersey.

The season of 1908 came in good and looked as if it was going to be a record-breaker for caterpillars, but the hopes of collectors were soon shattered. The season as I found it was on the whole, as follows:

Lycaena pseudargiolus and its variations were all rare. There used to be no trouble in collecting from one hundred to one hundred and fifty specimens in a day, but last season three trips were made to the home of this species and less than twenty specimens in all were seen.

Lycaena comyntas was nowhere abundant. Other seasons this creature could be seen almost anywhere.

Thecla augustus was rarer last season than it has been for the last twenty years and only four specimens were seen.

Thacla damon:—No specimens of this species were seen by me in 1908, and only a very few since 1904. In that year the species was so abundant that if one would shake a cedar tree, which is its food plant, in the vicinity of which it bred as high as twenty specimens would fly off. Why this species should become so rare the next season is a mystery to everyone. In that year either the parasites or some disease must have atacked them and consequently reduced them almost to extinction.

Thecla edwardsii was not rare, but not near as common as in the two previous seasons.

Thecla titus:—No examples of this species were seen by me last season although search for them was made in the locality where they usually occurred.

Thecla melinus:—No specimens were seen for the last three seasons.

Thecla calanus:—The habitat of this species was not visited and consequently no specimens were seen.

Chrysophanus hypophlaeas:—This species which was one of our commonest butterflies not more than five years ago is becoming rarer every year, and only odd specimens were noticed last season. In 1906 it was so rare around Newark

that I was unable to get any for my collection. I did manage to get a half dozen at Barnegat City. In former years thousands of specimens could be seen almost everywhere. The cause of such a decrease in numbers must be attributed to parasites or disease of the caterpillars.

Chrysophanus thoe:—This is a local species and not at all common. Several trips were made to the breeding places of this species in the last two seasons, but no sign of any were seen.

Chrysophanus epixanthe:—Although this species is recorded from New Jersey I have never been successful in finding any.

Pieris rapae was, as usual, quite plentiful throughout the State.

Anthocharis genutia:—This species has been quite common ever since they were discovered on the Garrett Mountains near Paterson, and several hundreds were taken every season by the Newark, New York and Brooklyn collectors; but last year there was a general scarcity and the stock in the collectors' boxes is now rather low as compared with former seasons.

Colis philodice:—This species was as plentiful as ever.

Terias lisa was quite rare in late years, but last season this little creature could be seen wherever its food plant occurred and in many places in goodly numbers.

Danias plexippus was common throughout the State.

Euptoieta claudia was common throughout the State and especially near Elizabethport at the edge of the salt marsh.

Argynnis idalia was rare compared with other seasons. The species was very common in 1900. In that year no less than five hundred specimens were taken by me in three days at Hilton, N. J., and fully half of them were females. The reason so many were taken is that their breeding place was being destroyed. One hundred and sixty females were taken in copulation, and half of these females were liberated in another section of the State where the food plant (Violets) was in abundance. This seemed to be an out of the way place for this

species as I never took any in that region before. The transference of this species was successful as was proved by the fact that in the next season *idalia* were plentiful at this new place. On the other hand at the old grounds none were to be seen because their food plants were all destroyed.

Argynnis cybele and *aphrodite* were as plentiful as ever last season.

Argynnis myrina was very common almost everywhere, while on the other hand *bellona* was rare all over the State.

Melitaea phaeton was not common last season. The most harmful thing that befalls this species is the burning off of the brush every winter when hundreds of the young caterpillars are in this way destroyed.

Phyciodes nycteis:—No specimens of this species were seen although I went over some of the ground where they were formerly to be found.

Phyciodes tharos was as common as ever.

Grapta interrogationis and *coma* were quite rare. A very few were seen during the season.

Grapta j-album:—Four specimens of this species were taken early in the spring on the Orange Mountains near the South Orange Road.

Vanessa antiopa:—Very few were seen last season.

Junonia coenia:—This species was common throughout the State especially so in the southern parts along the coast.

Limenitis ursula:—Very few of this species were seen the past season.

Limenitis archippus was quite common all over the State.

Satyrus alope was common, especially in the northern part of the State.

Papilio ajax var. *marcellus*:—Two specimens were seen, one at Belmar and the other at Sea Girt.

Papilio philenor:—I did not see an example of this species last season.

Papilio polyxenes were quite common everywhere.

Papilio troilus was common throughout the State.

Papilio turnus was abundant, that is the second or summer brood.

Papilio cresphontes was rather rare in 1908 although in 1907 it was quite common.

The caterpillars of most of the species of *Papilio* and Sphingoidea were rare last season, and many apparently did not make their appearance at all.

Hemaris thysbe was rare throughout the State.

Amphion nessus:—No specimens were found by me and by the appearance of things none of the other collectors succeeded any better than I did.

Sphecodina abbottii:—This species has been rare for several years and none were seen at all last season.

Deilephila lineata:—This species has been rare for several seasons although it used to be very common in this section of the State.

Pholus pandorus:—No examples of this species were taken by me for several seasons. Years ago there would have been no trouble to obtain fifty to one hundred caterpillars.

Pholus achemon:—This species has also been getting rarer and very few are now found in this section.

Ampelophaga choerilus:—This species is practically extinct in and around Newark. No specimens were taken by me for the last six years, although very close search was made for them.

Ampelophaga myron has been as common last season as heretofore.

Ampelophaga versicolor:—No specimens were found by me last season. This species has always been rare around this part of the State.

Phlegethontins quinquemaculata has not been as abundant last season as in former years.

Phlegethontins carolina:—This species apparently received a severe blow in 1907. Hundreds of caterpillars were found in that year, but fully ninety per cent. was parasitized. The result of this parasitism was that there were practically no caterpillars in 1908.

Phlegethontins cingulata:—No specimens of this species were found by me since 1899. In that year fifteen caterpillars were taken by me on morning glory.

Sphinx kalmiae:—Was not found around this section for the last two years as far as I am aware.

Sphinx drupiferarum has become a rare species around this section and I only found six caterpillars last year.

Sphinx gordius can be counted among the rarities in this section. This species used to be so very common that it was not difficult to secure several hundred caterpillars in a season if wanted. I have not found any in the last five years. This is another species which is generally a victim to parasitism. Undoubtedly the decrease in numbers in late years is largely due to this cause. There is still sufficient food plants around this vicinity, but the larva is probably a thing of the past.

Sphinx luscitiosa has seen its best days in Newark, and next year will probably see the last of them. This can be quite certain as far as the old collecting ground is concerned, as this will be destroyed in the coming year.

Sphinx chersis:—Has been quite common last season, but fully ninety per cent. of them were infested with parasites. This will undoubtedly mean a decrease in numbers of this species next season.

Sphinx eremitus:—No specimens were found by me.

Sphinx plebeia:—No specimens were found by me, but both this species and *eremitus* were taken in fairly good numbers by Jersey City collectors.

Dolba hylaeus is a thing of the past as far as Newark is concerned.

Chlaenogramma jasminerarum was a rare insect last season and as far as I am aware none were secured.

Ceratomia amyntor was very rare in the vicinity of Newark. About a dozen were taken by me and by all accounts other collectors did not do much better.

Ceratomia undulosa:—This species has been rather rare last season compared with former years. None were taken at the old breeding places around Newark. A few were picked up in Hudson County.

Ceratomia catalpa:—This species invaded New Jersey several years ago in great swarms and in 1907 it could be found al-

most anywhere the food plant *Catalpa* occurred and it was a pest in the Nurseries as far north as Eagle Rock. But most of them were infested with parasites. The work of this little insect put a complete check on to this species, and last season very few caterpillars were seen. If the parasite did not do such good work the catalpa sphinx would be a pest to the nursery as bad as any insect that they have to contend with, aside from the San Jose scale.

Lapara coniferarum:—This is a rare species and no specimens were taken by me in the last two years.

Smerinthus geminatus used to be a very common species in Newark, but was very rare in the last two years.

Paonias excaecatus was very abundant in 1907 but in 1908 they took a big drop and not more than fifteen caterpillars were taken by me. Most of the pupæ must have died during the winter 1907-08 as very few of the caterpillars taken in 1907 were infested with parasites.

Paonias myops fared on the whole about as well as *excaecatus.*

Paonias astylus:—This species is a thing of the past in Newark, due largely to the elimination of their food plants. This species is more protected from parasites than many of the other species, but has always been counted amongst the rarities.

Cressonia juglandis was not as abundant last year as in former years, but was not at all rare.

Philosamia cynthia has been common around Newark for many years. Hundreds of the cocoons are collected every Fall, but there seems to be no apparent decrease. Cynthia seems to be very local and only in late years are they spreading southward. They are now found at Elizabeth but not further southwest than that city. It looks as if they took a southwest course and are going to follow the coast line. South Amboy is the farthest place south and west from Newark, where it has so far been found in New Jersey.

Samia cecropia has also been a common species in Newark, there never was much trouble to secure several thousand co-

coons in the Fall, if wanted, but this cannot be said at the present time. The reason for such a decrease in the numbers of this species has been explained. In 1907 a disease attacked the caterpillars which seemed not to inconvenience them until they began spinning their cocoons. Then they died without pupating, sometimes even before the cocoon was completely finished. The parasites also had a share in the work but were not as effective as the disease in causing a material decrease in the numbers of the species. The result is that in some places where hundreds could have been secured three years ago, there was not an indication of one last year. It will undoubtedly be several years before this species obtains a solid footing again in this vicinity.

Callosamia promethea:—This species was not very rare last season, but for some unknown reason, was not as abundant as in former years.

Collosamia angulifera has not been any more rare than in former years.

Actias luna has been quite abundant last season. It has not been at all common heretofore, but last year it turned up in good numbers in many parts of the State. Fully 50 per cent. were infested by parasites. There will undoubtedly be a decrease in numbers of this species next year.

Telea polyphemus took a big drop last year. The same disease and parasites that infested the *cecropia* also did its work with this species. Fully 90 per cent. less were found in 1908 than in 1907.

Hyperchiria io was practically absent last year as far as Newark and vicinity is concerned. This species has always been common, but the parasites have reduced the caterpillars to a large extent in late years, and in 1907 they practically put a finish to their work. In that year hundreds of caterpillars could be seen hanging on the twigs, dead, due to the work of the parasites.

Eacles imperialis was as common last year as in previous years.

Cithoronia regalis was quite common, but most of the specimens were infested with parasites.

Anisota stigma has always been a very common species in the vicinity of Newark and was abundant in 1908.

Anisota senatoria was quite rare in 1906-07 but in 1908 it turned up in great numbers.

Dryocampa rubicunda:—This is a thing of the past in Newark. There used to be several places in Newark on which hundreds could be collected, but these places have been destroyed, and there is no chance for this species again getting a foothold.

All *Papilio* caterpillars were rare with the exception of *turnus*. This species turned up in great numbers in September. Eggs and caterpillars could be found on almost any tulip or wild cherry trees, but by the end of September a disease attacked the caterpillars and it was not long after that it took close searching to find any specimens at all.

It will be noticed by the above statement that many species were reduced by disease and parasites, and it will be interesting to watch conditions and take notes next season.

The Genitalia of the Group Noctuidae of the Lepidoptera of the British Islands.

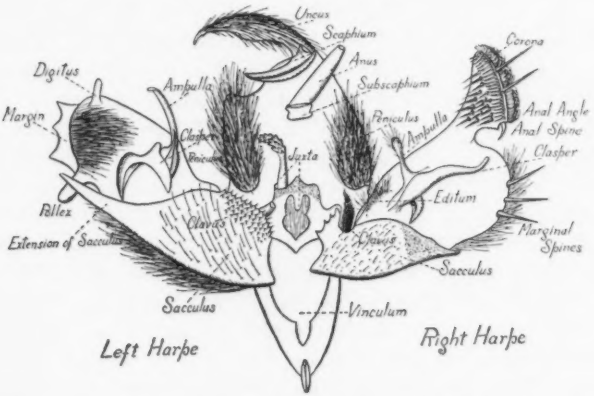
By John B. Smith.

The above is the title of one of the most interesting and important works that has appeared concerning the Noctuidæ of any country for some years. It is not a bulky work—less than 100 pages—but there are also 32 plates with over 300 figures, illustrating almost every British Noctuid species. The author of this work is Mr. F. N. Pierce, F.E.S., of Liverpool, and the publisher is A. W. Duncan, 65 South John Street, of the same city.

The subtitle states that it is "An account of the morphology of the male clasping organs," and the first plate is devoted to an illustration of an ideal structure in which all the parts are named. This gives us, for the first time, a consistent and well considered terminology for these organs, and the figure is here reproduced on a somewhat smaller scale for the benefit of American students.

No institution and no working lepidopterist should be without this little book, which contains the results of many years of painstaking work and which assists in fixing the status of quite a number of doubtful species.

The author believes in his work—and so do I—but he is not over-assertive and does not claim infallibility; in fact he prints on the fly leaf that, "He who never makes a mistake never makes anything," and so he gives his conclusions in a systematic careful way, backing them up with figures which, to one who has examined as many of these structures as I have, bear all the indications of accuracy.



Possibly my approbation of this essay may be explained in large part by the fact that Mr. Pierce's conclusions are so exactly like my own on the same subject and that his work bears out to the full my own contentions as to the importance of these structures in the determination of species.

There is no such thing as abstracting a work of this kind; it must be read to be appreciated.

C. T. BRUES has been appointed instructor in economic entomology at Harvard under Professor Wheeler and will take up his residence there the beginning of September. His address will be Bussey Institution, Forest Hills, Boston, Mass.

Observations on the Mating Habits of Oecanthus.

By C. O. Houghton, Newark, Delaware, Entomologist, Delaware Experiment Station.

On September 25, 1908, the writer collected two male and two female tree crickets on peach trees, set last Spring, in an orchard on the College Farm near Newark, Del. They proved to be *Oecanthus nigricornis* Walk., ♀ ♂ ; *O. nigricornis* var. *quadripunctatus* Beutenm., ♂ and *O. Nigricornis* var, *argentinus* Sauss., ♀*. These specimens were placed singly in shell vials and brought to my laboratory, where they remained, separated, over night. At 9 o'clock the following morning I placed the pair of true *nigricornis* in a large glass cylinder containing sections of small peach limbs with their leaves and the other pair in another glass cylinder which was similarly equipped. As soon as the males discovered the females they began to trill, the sound being produced by rapidly rubbing the tegmina together while they were held aloft over their backs, at right angles, or nearly so, to the body axis. These trills, which lasted from five to ten seconds each, were repeated at short intervals and the males kept working gradually toward the females. When thus moving, the tegmina would sometimes be lowered but frequently they would be held aloft as the insects advanced. At first the females seemed a little shy and kept out of the way of the males. This continued for about half an hour when (about 9.30 A. M.) my observations were unfortunately interrupted and I was obliged to leave the laboratory for a time. At 10 o'clock, or very close to that time, I returned and found both females resting upon the backs of the males, each with her mouth closely applied to a depression in the dorsal part of the thorax, just behind the base of the wings. Each female was resting with the tarsi of the first pair of legs upon the femora of the middle pair of legs of the male and was working away at the depression, from which she seemed to be securing a thick, glutinous liquid; this was, apparently, swallowed.

*Determined by Mr. A. N. Caudell, through courtesy of Dr. L. O. Howard.

Finding that it was impossible to give close attention to both pairs at the same time, I confined my observations mainly to the pair of true *nigricornis*. The reason for selecting this pair was that the female was seen to have what appeared as a tiny ball or sac, considerably smaller than the head of an ordinary pin, attached by means of a slender peduncle at a point near the base of the ovipositor. None was observed on the other female at this time.

While the female *nigricornis* kept working away at the thoracic depression of the male, the latter remained quiet, *i. e.* did not trill; but if she started to leave he would trill, whereupon she would generally return to her work. If she moved entirely off his back he would trill and back towards her. It was quite evident that he enjoyed her presence there and evidenced the fact by switching his antennae and rolling his head; the wings were also kept moving slightly in and out. Finally the female left the male, and, retiring to a point a short distance away, elevated her body, at the same time curving forward the end of her adbomen, then reaching forward between her legs she seized the sac that still remained attached near the base of the ovipositor and detached it. She then settled down upon the leaf and proceeded to manipulate it with her mouth parts for a time, after which she chewed it up and swallowed it. Following this she rested quietly on a leaf for some time, as did also the male in another part of the cage.

Random observations upon the other pair of crickets showed that they went through practically the same maneuvers.

At about 11.15 A. M. the male *nigricornis* again began to move about somewhat, and at 11.17 reached the leaf upon which the female rested. He immediately began to trill and back up towards her, but she kept moving away. This maneuvering continued until 11.38, when she again mounted his back and received another sperm sac from him. In doing this she lowered her body and curved the end of her abdomen downward somewhat, while he raised his body and backed up,

his cerci apparently acting as guides in reaching the necessary position. The process required but a few seconds—not exceeding 8-10—for completion, after which the female began to work away again at the thoracic depression. At 11.49, or just 11 minutes after she mounted his back, the female left the male and took up her position on another leaf, while the male began to move about nervously. At 11.50 the female prepared to remove the sperm sac and this was accomplished at 11.51. She immediately began to manipulate it with her mouth and three minutes later had swallowed the last of it. She then put her mouth to the leaf just beneath and began to move it about as if searching for any particles that might have been dropped.

I had just finished my observations upon this pair when the other pair assumed the proper positions for the female to take another sperm sac. This was accomplished at just 12 o'clock. Following this she worked away at the thoracic depression for nearly 20 minutes; this was not wholly continuous, however, for she would sometimes leave the male for a few seconds. He would invariably follow, trilling, and she would soon go back to work again. At 12.19, however, she lost her hold and fell and the male immediately began to run about nervously and trill. But he failed to find her and she soon took up a position on a leaf near the bottom of the cage. At 12.21 she raised her body, brought the end of her abdomen forward and cleaned off her ovipositor after having first touched, with her mouth parts, the sac. Apparently she was in no hurry to remove it, for she leisurely cleaned her ovipositor, allowing the sac to remain until 12.22½. She then seized it, pulled it off and ate it. Her feast was finished at 12.24.

I left the laboratory shortly thereafter, for lunch, returning at 1.45. I found the pair of *nigricornis* separated and resting quietly on the leaves, having, apparently, remained inactive during my absence. The other pair were close together on a small branch which was standing nearby perpendicularly, the female headed up and the male down. She was close to

some egg-scars on the branch and I thought that she had been ovipositing. The pair remained quietly in this position until 1.51, when the female began to drill a hole with her ovipositor. Two minutes later the male trilled. At 1.57 the male trilled again, dropped his tegmina, moved over in front of the female and raised the tegmina again. The female paid no attention to him, however, but removed her ovipositor, cleaned it somewhat with her mouth, then moved down and began to cover the egg. This she did by biting off some of the bark in the immediate vicinity of the outer end of the egg, mixing saliva with this, apparently, and pasting the mixture over the egg-scar. While she was thus engaged, the male kept moving about, trilling occasionally, and finally went to the top of the branch upon which they had been resting. At 2.17 the female began eating a peach leaf at a point where it was partly bad. Previous to this she had been moving about the cage considerably and once got into position to receive another sperm sac from the male. For some reason, however, she did not secure one and she immediately left him. At 2.19 the male again approached the female, trilling, but she moved away from him. They soon assumed positions on separate leaves where they rested for some time. At 2.34 the male again sought the female and, trilling, backed up to her with tegmina raised; she, however, paid no attention to him. At 2.42 the male again backed up to the female and she assumed the old position upon his back, but would make no effort to secure from him another sperm sac, although it was evident that he made an attempt to give her one. Whether or not she received one from him soon thereafter I cannot say, as my observations on this pair ceased for a period about that time. At 4.05, however, she was seen to be working away again at the thoracic depression and she had another sac attached near the base of her ovipositor.

I am under the impression that this was the third sac for the day, in fact I feel quite positive that it could not have been otherwise, but possibly it was the fourth.

She continued to work away at the depression more or less

continuously until 4.23, when she left him and moved over upon another leaf. He followed, trilled, and backed up in front of her with tegmina raised. She reached under her body and touched with her mouth the sperm sac, but did not detach it. Then she went to work upon the male again. She soon left him, however, and at 4.26 detached the sac and began to eat it. While doing this she was interrupted by the male, who again sought her out, trilled and backed up under her, forcing her to notice him. She started to again work upon him, but stopped almost immediately and moved away, the male following her and trilling. At 4.30, whether intentionally or otherwise, she dropped to the bottom of the cage, while the male mounted to the top of the branch and began to clean his antennae and tarsi by passing them through his mouth parts. A couple of minutes later the female assumed a resting position upon a leaf near the bottom of the cage, and began to clean her ovipositor. This ended my observations on the pair for the day.

The other pair (♂ *nigricornis* var. *quadripunctatus* and ♀ *nigricornis* var. *argentinus*) remained comparatively quiet all the afternoon. So far as could be observed they did not come in contact with each other at all, and I heard the male trilling but once during that time, I think.

In making the observations recorded above, I did not see what I would term true copulation—simply the reception by the female of the sperm sac from the male. Dr. Hancock* speaks of a true union of the sexes, but makes no mention of a sperm sac. Blatchley (see below) states that he observed no intromittent organ of the male or "any union of the parts

*The habits of the striped meadow cricket, *O. fasciatus* Fitch, Am. Naturalist, January, 1905, Vol. XXXIX, pp. 1-11.

It should here be stated that the observations above recorded were made and notes taken thereon before the writer had seen this admirable paper by Dr. Hancock, or the notes by Prof. Blatchley on the mating habits of the same species, as recorded in his Orthoptera of Indiana, p. 452. The references to these articles were kindly furnished to me by Mr. A. N. Caudell, through the courtesy of Dr. L. O. Howard, in a letter from the latter, dated October 23, 1908.

at the end of the abdomen." Evidently he saw only the working of the female at the thoracic depression of the male. Dr. Hancock terms this organ the "alluring gland" and thinks its functions "is solely for the purpose of alluring the female." Possibly this is so, but why does she continue to work away at this organ for a considerable period of time after the object of their union has been accomplished—the reception by the female of the male sperm sac? Can this be a provision of nature to keep her attention occupied for a time in order that the spermatozoa may have time to pass into her organs? If not thus entertained, possibly she would detach the sac at once upon receiving it from the male.

WE have just received, as we were going to press, a new and interesting work on entomology, entitled "Our Insect Friends and Enemies, the Relation of Insects to Man, to Other Animals, to One Another and to Plants, with a Chapter on the War against Insects," by John B. Smith, Sc.D.—J. B. LIPPINCOTT, Philadelphia.

NOTE.—The undersigned has undertaken the task of fully indexing the literature of the Orthoptera of the World subsequent to the year 1900. The task is not a light one, but will, it is hoped, ultimately prove well worth the labor involved. Publication is not contemplated for many years but in the meantime the index should be of much use in various ways. By the constant use of guide cards indicating reductions to synonym, or resurrections therefrom, and the transfer of species from one genus to another, it is hoped to make this more than a mere list of names.

In conjunction with the above undertaking an exhaustive Bibliography has been attempted and geographical and systematic indices are kept, listing articles treating of the fauna of different places and citing tables and important discussions of genera and higher groups.

To facilitate the above work the writer earnestly requests separates of articles from authors writing on the Orthoptera. The importance of the request is considerable and its maker hopes that it will be favorably considered by all orthopterists. The writer will be glad to exchange separates so far as possible and stands ready at all times to transmit facts and data from the index to any one desiring such information. The index is now complete to date so far as it has been possible to secure the literature.—A. N. CAUDELL, U. S. Nat. Museum, Washington, D. C.

American Snowball Louse, Aphis viburnicola n. sp.

C. P. GILLETTE, Fort Collins, Colo.

(Plate XI).

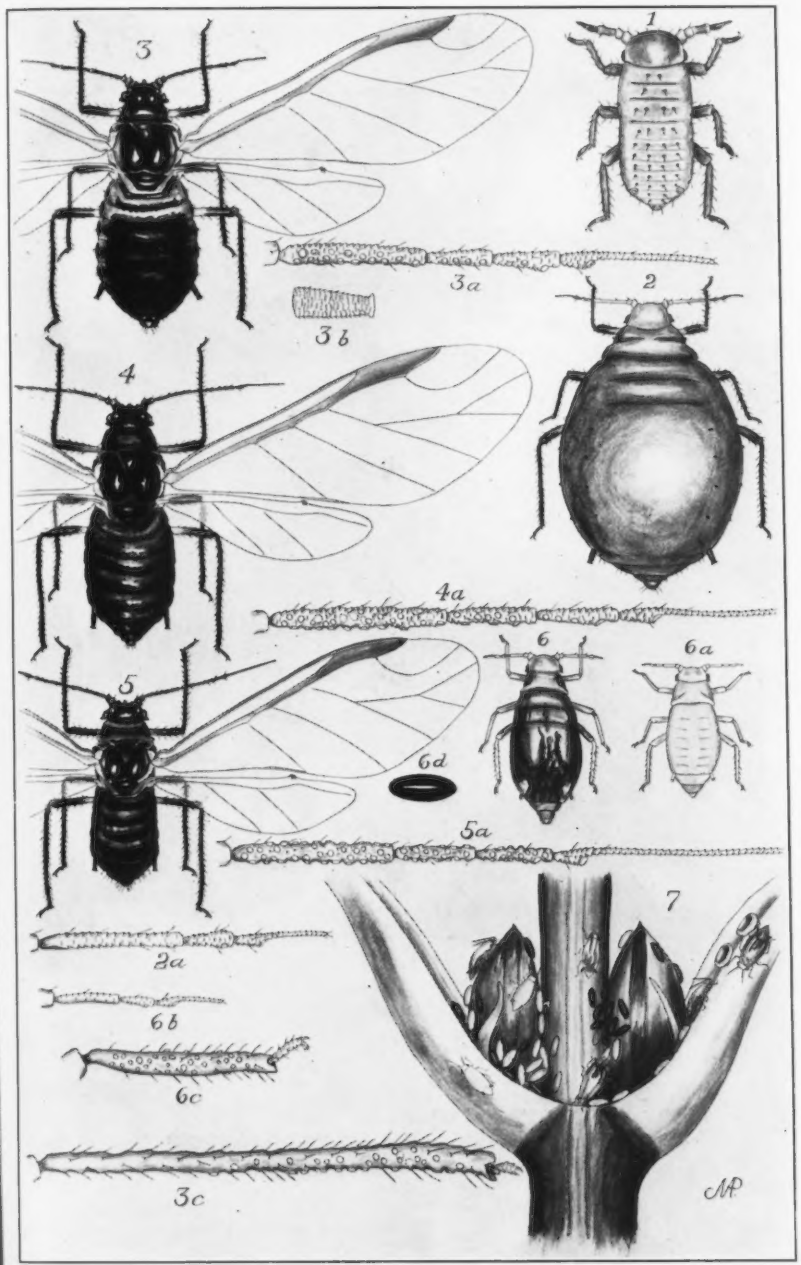
For the past nine years, at least, I have noticed the injuries of a plant louse which attacks the common snowball (*Viburnum opulus*) in Colorado. At first I supposed this to be the *Aphis viburni* described by Scopoli,* Shrank and other European writers, but I have been unable to harmonize any of the descriptions made in Europe with the louse as I have observed it. According to Scopoli's brief description in Entomologica Carniolica, 1763, the apterous form of this louse is earthy in color at first, becoming black later and with antennae as long as its body. Buckton in British Aphididae, Vol. ii, page 79, quotes Sulzer as saying that the male of *viburni* is apterous, which is never the case with the species occurring here. Sulzer's description I have not seen. Kaltenbach (Monographe der Pflanzenlause, page 78) describes the apterous form of *viburni* as "blackish brown or entirely black * * * the young set with strong rather long spines," and the alate form as having the thorax "black, polished; abdomen dark green," and also states that the louse occurs on the bushes from June to October. From the middle of June to about the 10th of September the snowball bushes here have been entirely free from this louse. Koch (Der Pflanzenlause, page 122) also describes and figures *viburni* as a black louse. Buckton's descriptions and figures of *viburni* are also quite unlike the louse occurring here upon snowball, and especially is this true of his characterizations of the viviparous and the oviparous females. For these reasons I am considering this American species new.

Young stem-mother, Plate XI, fig. 1.

Specimens from insectary before the first molt.

Color apparently ashy gray, but the body is really a very pale greenish yellow and is heavily covered with fine gray powder. Several rows of black dots extend along the median line of the dorsum; upon the meso- and metathorax there is a double row upon either side of the median line, and these are continued over about the first five abdominal segments, where the outer rows cease, and the inner ones continue to about the eighth segment. The cornicles are hardly elevated above the surface and appear from above as two concentric black rings, the outer being the

* I am under obligations to Mr. J. T. Monell for a copy of Scopoli's description.



APHIS VIBURNICOLA GILLETTE.

heavier. Antenna stout, five-jointed (counting the unguis), the 4th and 5th joints being united into a spindle-shaped portion strongly constricted at the base. A row of black dots also extends along either lateral margin of the body, each black spot bearing a dark hair; head, antennae and legs dusky brown; legs and antennae stout and rather hairy. Length .51 mm.

Young adult stem-mother.

From snowball bush in insectary, and just beginning to give birth to young.

General form very plump, color bluish white, due to the entire body, except the terminal segment of the abdomen, being covered with a white powder; eyes, distal half of antennae, cornicles, tarsi, tibiae and point of of beak black; distal halves of middle and hind femora dusky. Length of body 2.50 mm.; width 1.50 mm.; antennae .90 mm.; joints three .37; four, .11; five, .09; six, .16 mm.; cornicles, .18 mm. Cauda small, broad as long, dusky in color as are the genital plates also. Cornicles short, stout, tapering, and with moderate flange.

In alcohol or balsam the general color is pale green, sometimes showing a little orange in the region of the cornicles. Eyes dark red. Lateral tubercles of prothorax small and weak, and similar slight tubercles upon about 3 or 4 of the abdominal segment.

Old adult stem-mother Plate XI, figs. 2 and 2*a*.

The old stem-mothers taken May 18, 1908, with large colonies of their young, many of which were about to become winged, were deep green, almost a blue-green in color, with more or less white powder over the entire body. Some specimens, however, had the powder nearly all off from the dorsum. The cornicles, genital plates, hind margin of eighth abdominal segment, distal half of the very small cauda, distal ends of antennae and beak, all of cornicles, tarsi and tibiae, and greater portion of femora black or blackish. The body, legs and antennae are rather sparsely set with very delicate pubescence; lateral thoracic and abdominal tubercles very weak; eyes dark red. Upon the dorsum may be seen from 2 to 6 longitudinal rows of small black or blackish specks when specimens are put in alcohol. Length of body 2.75–3 mm.; antennae 6-jointed and about .90 mm. long.

Young or second generation..

The young that are given birth to by the stem-mothers are apparently white, but really slightly tinged with green or a very light yellow, and have red eyes as the only conspicuous dark parts; the tarsi and extreme end of the beak are also dusky to black. The body above lacks entirely the small black dots and dusky colorations upon the head that show upon the young of the stem-mothers, but the bodies are dusted with white powder.

Pupa.

The pupae vary from pale green to very pale yellow (almost white), and have no dark coloration except the red eyes and the dusky to black-

ish distal ends of antennae, beak, the tarsi, and, in some, slightly darker extreme tips of the short cornicles. The body is lightly covered with white powder.

Alate female, second generation, spring migrant, Plate XI, figs. 3, 3*a*, 3*b*, 3*c*.

From examples taken May 20, 1908, at Fort Collins, Colo.

General color above black, including legs (except proximal ends of femora), cornicles, genital plates and antennae; basal portion of the abdomen and most of the venter pale yellowish green; the dark portion of the abdomen seems really to be a very dark green, at least in younger examples. Length of body 2.50 mm.; wing 3.60 mm.; antennae 1.20 mm.; joints of antennae about as follows: three .39; four .18; five .17; six .09; seven .30 mm.; cornicles .20 mm.; cauda .10 mm., very short, and rather bluntly rounded; cornicles nearly cylindrical, a little constricted near the end, and with a moderate flange. Joints 3 to 6 of antenna rather stout, joint 3 usually with about 16 circular, slightly tuberculate sensoria of varying sizes, the number, however, is subject to considerable variation; joint 4 with 2 to 4, and joint 5 with 1 to 3 sensoria; joint 6 very abruptly constricted to the flagellum or 7th joint. On the middle of the lateral margin of the prothorax there is a short blunt tubercle and usually a similar tubercle may be seen at the postero-lateral angle; a similar but shorter blunt tubercle occurs upon the lateral margins of each abdominal segment before the cornicles; on joint 8, just anterior to the base of the cauda, is a pair of small tubercles that are nearly transparent and resemble tuberculate sensoria; beak barely attaining hind coxae; no pronounced antennal tubercles; antennae, legs and body rather sparsely set with short stout hairs; hind femora swollen in distal half, where there are 20 or more sensoria. This is the first and only case I have known of sensoria occurring upon the tibiae of a spring migrant of any viviparous female aphid.

Winged viviparous female; return migrant, Plate XI, figs. 4, 4*a*.

The head, mesothorax, antennae, tibiae, and femora at their distal ends, tarsi and honey tubes black; prothorax and style dusky brown; wings hyaline, with the veins brown, stigma dusky, subcostal vein fully twice as broad as the costal. The abdomen is rusty brown at base, with darker transverse bands towards the cornicles, and is nearly or quite black upon the middle of dorsal portion. Subanal plate black; abdomen rusty brown below, and about three black spots along either lateral margin; style very short, about one-half as long as the tarsi. Length of body 2.7 mm.; length of wing 4 mm.; antennae 1.50–1.60 mm.; cornicles .20 mm.; cornicles slightly larger towards the base. There is a small tubercle on either side of the prothorax near the hind angles. The joints of the antennae measure as follows: one .08 mm.; two .06 mm.; three .40–.48 mm.; four .22 mm.; five .20 mm.; six .10 mm.; seven .40–.48 mm., the seventh joint usually some longer than the third. Joints three, four

and five have many circular tuberculate sensoria. Joint three has about 30, four about 8, five about 4 sensoria, and six has the usual cluster at the tip. The number to a joint is somewhat variable.

Alate male, Plate XI, figs. 5, 5*a*.

Head, antennae, lobes of mesothorax, legs, except bases of femora, sternum, pleura of mesothorax and cornicles black; abdomen rusty brown; eyes very dark red, appearing almost black. Length of body 1.80–2 mm.; antennae 1.60 mm.; joints three .40; four .21; five .18; six .09; seven .51 mm. Joints three, four and five with very numerous small circular sensoria, joint three being specially rough and tuberculate; joint six very short and stout; cornicles short, cylindrical, .14 mm. long. The abdomen above is marked with more or less distinct transverse dusky dashes that are largest over the posterior half. Prothoracic tubercles usually present at hind angles; cauda very small; length of wing 3.40 mm., hyaline; stigma dusky, veins dark brown.

Apterous oviparous female, Plate XI, figs. 6, 6*a*, 6*b*, 6*c*.

The abdomen long and pointed posteriorly; when young, pale yellow, almost white in color; becoming sordid yellow to salmon-pink as they mature; eyes red; tips of cornicles and cauda blackish. Length 1.50–1.80 mm.; antenna .45–.50 mm. long, six-jointed, joint three the longest, being a little longer than 4 and 5 combined, and joint six is nearly as long as three. Cornicles short, cylindrical, not as long as hind tarsi. Hind tibiae broad, flattened, and with numerous oval sensoria of varying size throughout its length. There are no lateral tubercles upon thorax or abdomen.

A few important records at Ft. Collins are as follows:

April 10, 1904, the very earliest lice are now hatching and accumulating upon the opening buds of the snowball.

April 15, 1902, lice hatching and accumulating on the opening buds.

May 7, 1903, lice beginning to curl the leaves. Largest leaves about 1 cm. long. Many *Syrphus*-fly eggs are being laid; largest lice now 1.80 mm. long, pale green in color, and covered with powder, no spines or tubercles.

May 18, 1908, Ft. Collins, stem-mothers and their young abundant in the curled leaves, the former all deep blue or greenish blue in color, and the nymphs apparently all becoming pupae, some of which seem fully grown.

June 13, 1901, many white larvae and pupae, and some alate females. Apparently all stem-mothers are still living.

June 13, 1901, the louse upon snowball bushes does not agree with Buckton's description of *Aphis viburni*.

June 30, 1908, Ft. Collins, can find no lice on any of the bushes where they were so abundant in May.

September 10, 1907, alate males, viviparous females and the white oviparous females all present on leaves of snowball now. Some of the oviparous females are nearly full grown.

September 15, 1908, Ft. Collins. Mr. L. C. Bragg tells me he found the first return migrants upon snowball leaves today.

September 22, 1900, alate females are giving birth to white larvae upon snowball leaves.

September 27, 1908, Ft. Collins. Mr. Bragg brought snowball leaves in the laboratory today, having males, viviparous females and the little white oviparous females upon them.

October 8, 1908, Denver, Colo., alate males and females and oviparous females are plentiful upon leaves of snowball in city park.

October 15, 1908, Ft. Collins, some of the oviparous females are now fully grown and laying eggs.

October 17, 1899, scattering specimens of alate viviparous females on snowball leaves now.

October 25, 1900, both males and oviparous females are upon the leaves and adult oviparous females are laying eggs.

Mr. J. T. Monell, to whom I am indebted for many valuable notes and suggestions in relation to plant louse studies, permits me to make the following extract from his letter to me dated February 3, 1909.

"I have examined the slide of the *Viburnum aphis* with much interest and thank you for it. I think you will be interested to know that I have found the same species here and that it shows the same tibial sensoria. * * * I enclose brief notes which agree with your observations.

"Aphis, n. sp., 532, Apr. 24, '07.

"Cold backward spring. Stem-mothers with minute young, curling leaves into pseudo galls on snowball bush in my yard.

"Apr. 28, '07, green pulverulent stem-mother still present.

"May 10, '07, pupae and some winged lice in rolled leaves.

"May 11, '07, winged lice found but no apterous ones.

"Nothing further seen of the species though the bushes were frequently examined afterwards."

Mr. Monell also sent measurements of four antennae from spring migrants taken at St. Louis, Missouri, May 10, 1907, which are as follows:

JOINTS OF ANTENNAE IN MILLIMETERS.

THREE.	FOUR.	FIVE.	SIX.	SEVEN.
.399	.214	.185	.114	.385
.399	.214	.185	.114	.371
.385	.185	.171	.099	.357
.399	.199	.185	.099	.342

These notes upon the same species, from a distant point having a very different climate, are of special interest and tend to confirm the conclusions I had drawn in regard to the life habits of this louse, namely, that *Viburnum* is the over winter host plant, that the immediate young of the stem-mothers all acquire wings and leave the snowball bushes for other host plants, that the bushes are free from this louse from some time in June to September 1st, and that the alate males and viviparous females return to the snowballs in the months of September and October, the latter to deposit oviparous females, and the former to fertilize them.

The alternate food plant or plants I have not been able to find.

The most unique thing about this species is the presence of sensoria on the hind tibiae of the viviparous spring migrants; and it is quite usual, at least, for the second generation all to acquire wings in *Aphis* species.

EXPLANATION OF PLATE XI.

Aphis viburnicola n. sp.—1, young stem-mother a few hours after hatching; 2, old adult stem-mother with powdery secretion removed; 2*a*, antennae of adult stem-mother; 3, spring migrant; 3*a*, antenna; 3*b*, cornicle, and 3*c*, hind tibia of spring migrant, greatly enlarged; 4, fall migrant, female, and 4*a*, her antenna; 5, fall migrant, male, and 5*a*, antenna of the same; 6, adult oviparous female; 6*a*, young oviparous female; 6*b*, antenna; 6*c*, hind femur, and 6*d*, egg of adult oviparous female; 7, twig showing oviparous females and their eggs. Figures 2, 3, 4, 5, 6, 6*a* and 6*d* are enlarged 15 diameters; figure 1, 45 diameters; figures 2*a*, 3*a*, 3*b*, 3*c*, 4*a*, 5*a*, 6*b* and 6*c*, 60 diameters; and figure 7, 5 diameters. Drawings by M. A. Palmer.

NOTE.—The drawings in Plate VIII (March Number) of this volume were by Miss M. A. Palmer.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

To Contributors.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, three weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form, will be given free, when they are wanted; and this should be so stated on the MS., along with the number desired. The receipt of all papers will be acknowledged.—ED.

PHILADELPHIA, PA., JUNE, 1909.

Upon careful estimation it was found that the total value of crops raised in the State of Pennsylvania during the year 1908 amounted in value to over one hundred and seventy million dollars ($170,415,840). This was for barley, buckwheat, corn, hay, oats, potatoes, rye, tobacco, and wheat. The value from fruit culture, flowering plants, trees and shrubs we do not know. It has been estimated that insects take a toll of one-tenth, and on this basis the amount of money loss on the crops alone would be nearly nineteen millions of dollars in this one State. The value of economic work in entomology is rapidly becoming appreciated in Pennsylvania, and in fact all over the United States, but there is much to be desired. One thing that Pennsylvania needs is a list of its species of insects similar to the admirable one gotten out by Prof. John B. Smith, State Entomologist of New Jersey. Such a list would be a great aid and stimulus to entomologists and would encourage the non-professional collector. The New Jersey list has been a great stimulus and in time many States will publish lists of insects. Irrespective of value in economic work, geographical distribution and the other scientific studies are advanced by such compilations.

THE associate editor of the NEWS, Dr. Philip P. Calvert, has been granted leave of absence until October 1, 1910, by the University of Pennsylvania, where he is Assistant Professor of Zoology, to enable him to go to Central America to pursue further researches on the ecology of tropical Odonata. This is in continuation of the studies which have grown out of his preparation of the account of these insects for the "Biologia Centrali-Americana." Dr. and Mrs. Calvert sailed from New York on April 17 for Costa Rica. Their permanent address is 635 North Sixteenth Street, Philadelphia, Pa.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

PROF. LEVI W. MENGEL, the well-known lepiopterist of Reading, Pennsylvania, has been abroad for a number of months and has traveled up the Nile, visited Palestine and other places of interest. At present he is inspecting the various museums in western Europe.

ONE of the Cornell entomologists who is rapidly winning a reputation in his chosen field is Charles W. Howard, A. B., 1904. On completing his undergraduate work here, he remained as a laboratory assistant, in the department of Entomology for a part of the following year and, early in 1905, went to Pretoria as Assistant Entomologist to the Transvaal Department of Agriculture On the death of C. B. Simpson, B.S.A., 1899, he became Government Entomologist to the Transvaal. Recently he has transferred to Portuguese East Africa in a similar position.

Aside from the educational work which must accompany the introduction of modern American methods of Economic Entomology into a conservative colony, Mr. Howard's main work will be in studying and combatting insect transmitters of disease and in the fight against the locust plague.

Something of the extent of the latter may be seen from the fact that, in a single district of the colony, the locusts last year damaged the cocoanut crop alone to the extent of $360,000. On a big sugar plantation along the Zambezi River there have just been dug from among the canes, over an area of 2000 hectares, more than *fourteen tons* of locust eggs. In addition to this method of destroying the pest, oil was being spread along all the roadways and other areas where the young grasshoppers were hatching out. Mr. Howard has organized, in connection with this work, a system for collecting information which, during the year, should give much reliable data as a basis for the fight in the future.

In a recent letter, he writes that he is somewhat handicapped by lack of proper equipment, but that the work is being very liberally supported, and that as fast as he can collect apparatus, he will be able to obtain it. It is hard for us to realize what it means for so conservative a government to take the radical step of establishing and actively supporting such a department, and it may well be seen that the work will call for the exercise of the greatest tact and ability in handling men as well as demanding a knowledge of technical entomology. Mr. Howard's success in the past few years bespeaks an equally successful experience in his new field and his work will be watched with interest by his Cornell friends.—*Cornell Countryman.*

Doings of Societies.

The Entomological Society of Western Pennsylvania held its annual meeting at the Carnegie Museum on the evening of Monday, April 5. Officers were elected as follows: *President,* Dr. W. J. Holland; *Vice-President,* Henry Engel; *Secretary* and *Treasurer,* F. W. Friday.

The society formally tendered its thanks to Mr. Engel for the preparation of the list of the Lepidoptera of the region, which has recently been published, Mr. Engel having assumed the greater portion of the work which had been entrusted to a committee of which he was one of the members.

Plans for the vigorous prosecution of the general work of exploring the upper valley of the Ohio were considered. Mr. Hugo Kahl reported that he has in hand and he will shortly have ready for publication a preliminary list of the Diptera of the region.

The society inspected the new galleries and cabinets which are in process of erection in the laboratory of entomology in the Carnegie Museum, and which, when completed, will furnish accommodation for over a million and a half of insects properly labeled and displayed. The galleries are built of steel; the cabinets, which are being made in the shops of the Carnegie Museum, carry each one hundred and eighty drawers on the first floor of the gallery and one hundred and eighty drawers on the second floor. There are twenty of these cabinets, and there will thus be seven thousand two hundred drawers 18 inches wide, 24 inches deep, and 2½ inches high, lined with cork and made as nearly as it is possible to make such things dust and pest proof.

Dr. Holland displayed a collection of Heterocera which had just been received from Eastern Bolivia, from one of the collectors of the Museum, numbering about two thousand specimens. The extreme beauty and perfection of the specimens was commented upon by the members of the society.

F. W. Friday, *Secretary.*

EXCHANGES.

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☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

For exchange—Mexican moths, principally Sphingidae; wish the larger western butterflies in exchange.—W. R. Walton, 810 N. 18th St., Harrisburg, Pa.

Italian Macro Lepidoptera.—Perfect spread specimens accurately determined are offered in exchange for North American Macro Lepidoptera.—Giacinto Gianelli, Rivoli, Tornise, Italy.

Wanted.—*Elateridae* and *Buprestidae* from all parts of North America. Will give in exchange named Coleoptera and Lepidoptera (diurnals, in papers).—C. O. Houghton, Delaware College, Newark, Delaware.

Wanted for Cash.—Insect Life, Vol. ii, Nos. 2, 5, 11, 12; Vol. iii, Nos. 11, 12. Psyche, Vol. xii, No. 2. Entomological News, Vol. xv, No. 4. State price.—Wm. S. Marshall, 116 E. Gorham Street, Madison, Wis.

I have for exchange cocoons and pupae of *tityrus*, *D. myron*, *A. actomaculata*, *P. sexta*, *Ph. achemon*. Wish to exchange with collectors from California, Arizona and New Mexico. Also material from Europe and other duplicates. "Skeemers are not wanted."—J. N. Lang, 104 Bunker St., Chicago, Ill.

I am looking for extra large expanse Lepidoptera, especially Saturnians and Sphinges. Let me know expanse and price.—C. V. Blackburn, Stoneham, Mass., U. S. A.

All kinds of Moths and Butterflies to exchange for American species not in my collection. Sent lists to Joseph H. Reading, 775 N. Rockwell St., Chicago, Ill.

For exchange—Geological and duplicate entomological publications for other literature treating of insects. Lists furnished.—E. S. Tucker, Box 208, Dallas, Texas.

I have *Parn. apollo*, *delius*, *mnemosye*, *Arg. aglaia*, *adippe*, *lathonia*, *Sat. circe*, *hermione*, *alliona*, *Apatura ilia*, *clytie*, *Lim. populi*, Indian exotics, rarest Eupitheciae (bred). Wanted cocoons *cecropia*, *angulifera*, etc., *asterias*, *ajax*, *zolicaon*, etc. Catocalae eggs.—J. W. H. Harrison, 181 Abingdon Rd., Middlesbro', England.

Wanted—Pupae of Papilios, Argynnis, etc., also of certain Sphinges, in exchange for specimens in papers.—C. H. Bode, 2005 Carson Street, Pittsburg, Pa.

I have for exchange cocoons of *T. polyphemus*, pupae of *Od. carmelita*, *Bist. strataria* and *Selenia tetralunaria*. Send exchange list.—J. J. Henneberger, 10114 Ewing Ave., Chicago, Ills.

Wanted.—Entomological News, Vol. X, No. 10.—G. W. J. Angell, 235 W. 76th St., New York.

Lepidoptera Wanted.—*Argynnis diana*, male and female, by purchase or exchange.—H. S. Gladwin, Madison, New Jersey.

I wish to exchange the Hemiptera of the world, Heteroptera and Homoptera, and will give in return species from Hungary correctly named.—Robert Meusel, Janospuszta bei Szokolya Hont-megye, Ungarn.

For exchange.—Rare Lepidoptera and Coleoptera from Arizona for Entomological Literature.—V. W. Owen, Clerk's Office, U. S. Courts, Los Angeles, Cal.

I collect in all orders for cash. Price lists Coleoptera, Hemiptera, Hymenoptera for 2c. stamp. Positively no exchange.—A. H. Manee, Southern Pines, N. C.

I want Riley's Ninth Missouri Report. Will pay cash or exchange, literature or Lepidoptera I also desire to correspond with collectors possessing "freak" Lepidoptera with purpose of photographing same for study.—H. H. Newcomb, 43 Tremont St., Boston, Mass.

Am back on the farm again and would be pleased to collect insects in any order in exchange for Coleoptera and Hemiptera, for my collection, or literature on these orders. Meloidae, Coccinellidae and Membracidae especially wanted.—W. E. Snyder, Beaver Dam, Wisconsin.

Wanted for cash, named or unnamed material in the Trogositidae of United States, Canada and northern Mexico. Dates desirable. Locality must be guaranteed. Information regarding life habits appreciated. Write, stating particulars and prices.—R. P. Dow, 15 Broad Street, New York City.

Lepidoptera—I have for exchange bred specimen of *D. portlandia, A. andria, E. deflorata, P. ajax* and others.—Chas. L. Heink, 4320 N. 11th St., St. Louis, Mo.

I desire to exchange with collectors of Lepidoptera in Florida, Ariz. and Nevada, also South America, India and Japan. Send lists to A. F. Porter, Decorah, Iowa, U. S. A.

Following bred Catocalae—I hope in coming season give in exchange *fraxini, sponsa, nupta, elocata, electa, dilecta, conjuncta, promissa, puerpera, pacta, optata, fulminea, conversa, nymphagoga.* Would like American Catocalae only, the same first-class quality.—G. Eberhard, Berlin Friedenau, Beckerstr. i. Germany.

Lindsay Symington, of Looe, Cornwall, England, wishes to correspond with collectors in South and Central America; also California and other western parts of North America, with the object of friendly exchanges of papered Lepidoptera.

Fine Moths, live cocoons, butterflies, leaf insects, walking sticks, beetles, etc., from Assam, Darjeeling, Ceylon and Andaman Is., also bird's eggs (central blown), and orchids can be had from A. Meik, 4 Convent Road, Entally, Calcutta.

Exchange—I have for exchange the following specimens from the Canadian Northwest: *Argynnis lais, P. ismeria, M. harrisii, S. nephele*, var. *olympus, L. afra, L. rustica, L. Saepiolus.*—Wanted other Rhopalocera in return.—A. R. M. Boulton, 5 Morrin Court, Quebec, Canada.

Lepidoptera—Fine specimens of *A. genutia* and *P. protodice* var. *vernalis* to exchange for any species of *Anthocharis* or *Colias* except *Philodice.*—John H. West, 2229 N. Mascher St., Phila., Pa.

I wish to purchase American Lepidoptera and their cocoons and will also exchange European Lepidoptera and cocoons for American species. Gottlieb Schone, Gr. Salze bei Magdeburg, Welchhausenstr. 6 Germany.

Wanted in exchange or cash, in papers, *Cychrus*, Cicindelidae, *Carabus, Calosoma*, Lucanidae, Buprestidae and eggs of larger moths, only native.—Adolph Mares, 1206 So. Homan Ave., Chicago, Ill.

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257. **Hagen and Walsh**—Observations on certain North American Neuroptera by H. Hagen, with notes and descriptions . . . by B. D. Walsh, Proc., ii, 167-272, 1863 1,25

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